

DEOVRAT PRASAD

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<https://deovratprasad.github.io/dp/>

POSTDOCTORAL RESEARCH ASSOCIATE

Astrophysicist specialising in numerical modelling, with a focus on baryon cycle in galaxies, groups and clusters. Highly experienced in working with large-scale magnetohydrodynamic (MHD) simulation codes and the analysis of extensive astrophysical datasets. Possess a very strong foundation in physics as well as advanced mathematics. A critical thinker and quick learner, known for adaptability, problem-solving skills, and a strong team-oriented mindset. Actively seeking research scientist roles in physics modelling and simulation.

KEY COMPETENCES

Computational Fluids Modelling : Adept at problem formulation, design, and initialisation, new physics module development and data analysis and visualisation. Deep knowledge of hydrodynamic/magnetohydrodynamic fluid flows, waves and instabilities in fluids, turbulence, shocks, radiative cooling, and heat conduction in fluids.

Numerical Methods : Highly experienced with numerical matrix manipulation, eigen value problems, numerical integration, ODEs and PDEs, and time stepping methods. Experienced with root-finding algorithms, interpolation methods, approximation of functions, Monte-Carlo methods, Fourier analysis, tree algorithm, and non-linear dynamics and chaos.

Programming Tools: Proficient in C, C++, Fortran, MPI, Linux/Unix and BASH scripting. Extensively used Matlab, Visit, GNU plot, Python and Python based analysis tools like 'yt' for data analysis and visualisation of simulation data. Proficient in using Git/Github for computational tools development in large collaborations.

Software Development : Extensively worked in a multi-institution collaborative development and testing of physics modules for astrophysical problems. Highly experienced in working with a range of MHD codes like AthenaPK (fixed refinement, GPU compatible), Enzo (adaptive mesh refinement code), Pluto (spherical grid, fixed refinement) and Arepo (arbitrary Lagrangian-Eulerian code) on a variety of high performance computing facilities from ORNL, NASA, TACC, SCW, UCSD, MSU and IISc.

RELEVANT EXPERIENCE

Postdoctoral Research Associate | Physics and Astronomy **NOVEMBER 2022 - JUNE 2025**
Cardiff University | United Kingdom

- Successfully led 1 (evolution of massive galaxies) out of 5 projects for the XMAGNET project, a multi-institution collaborative very high resolution MHD simulation project using exascale high performance computing facility through INCITE computational grant.
- Project results presented to a wider scientific audience via multiple publications in leading peer reviewed journals, scientific conferences and departmental meetings.
- Leading the ongoing simulation project studying the role of cold-mode active galactic nuclei feedback in the evolution of massive galaxies in cosmological setup using Arepo - an arbitrary Lagrangian-Eulerian (ALE) code.
- Successfully implemented cold-mode active galactic nuclei feedback module in Arepo and carried out test runs.
- High resolution simulations being carried out and data analysed for publication in peer-reviewed journals.

Postdoctoral Fellow | Physics and Astronomy
Michigan State University | United States

JULY 2018 - JUNE 2022

- Led and completed multiple hydrodynamic simulation projects studying the evolution of galaxies, groups and clusters at low redshift.
- Projects included design and implementation of different initial conditions for galaxies, groups and clusters, implementation of black hole feedback module using “Active Particle” formulation in ‘Enzo’ adaptive mesh refinement code, carrying of high resolution long term evolution of these halos with multi-physics modules and analysing data from the simulations.
- Project results presented to wider audience via multiple publications in leading peer reviewed journals, contributed and invited talks at international scientific conferences, invited university seminars and departmental meetings.

EDUCATION

PhD | Astronomy and Astrophysics **AUGUST 2012 - APRIL 2018**

Department of Physics, Indian Institute of Science, Bangalore, India

Thesis Title :- AGN Feedback in Galaxy Clusters - Controlling Cooling Flows in Galaxy Clusters by Momentum-Driven AGN Jets (Advisor - Prof. Prateek Sharma)

Integrated MSc (5 year programme) | Physics **SEPTEMBER 2007 - APRIL 2012**

Center for Excellence in Basic Sciences, University of Mumbai, India

AWARDS & FELLOWSHIPS

- Junior/Senior Research Fellowship, CSIR, 24th All India Rank in National Eligibility Test, **2012-2017**.
- INSPIRE Fellowship, Dept. Of Science and Technology, Govt. Of India, **2007-2012**.

COMPUTATIONAL GRANTS

- Co-Principal Investigator - 1.23 Million GPU node hours allotted through INCITE (Frontier - Oak Ridge Leadership Computing Facility) computational grant on Frontier HPC system, **Jan 2023 - Dec 2024**
- Co-Principal Investigator - 1.6 Million CPU hours allotted through NSF XSEDE computational grants on Stampede & Expanse HPC systems, **Jan 2022 - Dec 2022**
- Principal Investigator - 2.05 Million CPU hours allotted through NSF XSEDE computational grant on Comet & Expanse HPC systems, **Jan 2021 - June 2022**.
- Principal Investigator - 1.23 Million CPU hours allotted through NSF XSEDE computational grant on Comet HPC system, **July 2019 - June 2020**.

RECOGNITION IN THE FIELD

- subject matter expert reviewer for a publication in The Astrophysical Journal, **2025**
- subject matter expert reviewer for UKRI funded computing resources proposal, **2024**
- subject matter expert reviewer in a NASA peer review, **2022**
- subject matter expert reviewer for a publication in MNRAS journal, **2018**

RELEVANT PUBLICATIONS

• The XMAGNET Exascale MHD Simulations of SMBH Feedback in Galaxy Groups and Clusters : Overview and Preliminary Cluster Results
Philip Grete, Brian O’Shea, Forrest Glines, **Deovrat Prasad**, et al, 2025, ApJ, 988, 155

• Environmental Dependence of Self-Regulating Black-Hole Feedback in Massive Galaxies
Deovrat Prasad, Mark Voit, Brian O’Shea, and Forrest Glines, 2020, ApJ, 905, 50

• Scalable Explicit Implementation of Anisotropic Diffusion With Runge-Kutta-Legendre Super-Time-Stepping
Bhargav Vaidya, **Deovrat Prasad**, et al. 2017, MNRAS , 472, 3147

Complete list of all publications can be accessed at : <https://ui.adsabs.harvard.edu/public-libraries/oczDkRSgS4uJgMWUz63qyg>

PERSONAL

Languages: English (Fluent), Hindi (Native)

Hobbies: Cricket, Football and Cycling